

What I Claim Is:

1. Apparatus for selectively interfering with pathological cells survival processes in vitro and in vivo comprising:

– means for generating static magnetic (S) fields crossing a working environment,

5 – means for generating electromagnetic extremely low frequency (ELF) fields over said working environment in addition to said S fields;

**characterised in that** it further comprises:

– means for modulating said S fields associated to said means for generating S fields, said means for modulating said S fields setting the intensity of said S fields between 1 and 100 mT

10 according to a predetermined function of intensity versus time;

– means for modulating said ELF fields associated to said means for generating ELF fields, said means for modulating said ELF fields setting said ELF fields according to a predetermined function of amplitude of intensity between 1 and 100 mT and frequency between 1 and 1000 Hz versus time.

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2. Apparatus for selectively interfering with pathological cells survival processes in vitro and in vivo comprising:

means for generating static magnetic (S) fields crossing a working environment,

characterised in that it further comprises

5 means for modulating said S fields associated to said generating means, said means for modulating the S fields setting the intensity of said S fields between 1 and 100 mT according to a predetermined function of intensity versus time.

3. Apparatus for selectively interfering with pathological cells survival processes in vitro and in vivo characterised in that it further comprises

10 means for generating electromagnetic extremely low frequency (ELF) fields over said working environment;

means for modulating said ELF fields associated to said means for generating, said means for modulating said ELF fields setting said ELF fields according to a predetermined function of amplitude of intensity between 1 and 100 mT and frequency between 1 and 1000 Hz versus time.

15 4. Apparatus according to any of claims 1 or 2 wherein said means for modulating said S fields comprises program means that set said intensity following a plurality of predetermined step values  $I_{s1}$ ,  $I_{s2}$ ,  $I_{s3}$ ,  $I_{sn}$  for corresponding time intervals  $T_1$ ,  $T_2$ ,  $T_3$ ,  $T_n$ .

5. Apparatus according to any of claims 1 or 3 wherein said means for modulating said ELF fields comprises program means that set said intensity amplitude following a plurality of  
20 predetermined step values  $I_{ELF1}$ ,  $I_{ELF2}$ ,  $I_{ELF3}$ ,  $I_{ELFn}$  for corresponding time intervals  $T_1$ ,  $T_2$ ,  $T_3$ ,  $T_n$ .

6. Apparatus according to any of claims 1 or 3 wherein said means for modulating said ELF fields comprises program means that set said frequency following a plurality of predetermined step values  $f_1, f_2, f_3, f_n$ , for corresponding time intervals  $T_1, T_2, T_3, T_n$ , said step values being comprised between 10 and 100 Hz.

7. Apparatus according to claim 1, wherein said means for modulating said S and ELF fields comprises program means that set an S/ELF ratio according to a plurality of predetermined step values  $I_{S1}/I_{ELF1}, I_{S2}/I_{ELF2}, I_{S3}/I_{ELF3}, I_{Sn}/I_{ELFn}$ , for corresponding time intervals  $T_1, T_2, T_3, T_n$ .

8. Apparatus according to claim 7, wherein said program means set said S and ELF fields according to an overall intensity between 1 and 30 mT and respectively a ratio S/ELF comprised between 0,1 and 10.

9. Apparatus according to claim 7, wherein said program means set said S and ELF fields according to an overall intensity between 1 and 10 mT and respectively a ratio S/ELF comprised between 0,5 and 5.

10. Apparatus according to claims 4 to 9 wherein said program means set said time intervals between 1 and 40 minutes.

11. Apparatus according to the previous claims wherein at least a portion of said working environment is defined by walls permeable to said fields.

12. Apparatus according to the previous claims, wherein said means for generating said S and/or ELF fields comprise at least a first and a second coil respectively surrounding at least a portion of said working environment, said means for modulating providing to said coils DC and/or AC current respectively.

13. Apparatus according to the claims from 1 to 11, wherein said means for generating said S and/or ELF fields comprise at least a first and a second coil coaxial to each other, said working environment being placed between said first and a second coil and said means for modulating providing to said coils DC and/or AC current respectively.

5 14. Apparatus according to the previous claims, wherein means are provided for creating through said working environment a static electric field, or a low frequency variable electric field up to 1000 Hz, having intensity up to 20 kV/m.

15. The use of SELF non thermal fields for selectively interfering with pathological cells survival, such as in particular cells affected by cancer, viral infections, autoimmune diseases,  
10 neurodegenerative disorders, AIDS, etc., characterised in that said SELF non thermal fields have intensity comprised between 1 and 100 mT, said SELF fields being different sequences of S and/or ELF fields, i.e. S fields followed by ELF fields, ELF fields followed by S fields, S and ELF field together, as well as the presence of S or ELF fields alone, said ELF fields having a field frequency comprised between 1 and 1000 Hz.

15 16. The use of SELF non thermal fields for biotechnological genes modifications, such as in particular for modification of mutant p53 gene, characterised in that said SELF non thermal fields have intensity comprised between 1 and 100 mT, said SELF fields being different sequences of S and/or ELF fields, i.e. S fields followed by ELF fields, ELF fields followed by S fields, S and ELF field together, as well as the presence of S or ELF fields alone, said ELF fields having a field  
20 frequency comprised between 1 and 1000 Hz.

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17. The use of SELF non thermal fields according to claims 15 or 16, wherein chemical substances are used in addition to the SELF fields.

18. The use of SELF non thermal fields according to claims 15 or 16, wherein said different sequences of S and/or ELF fields sequences are set for time intervals  $T_1, T_2, \dots, T_n$ , and wherein

5 in said time intervals the intensity of said S and/or ELF fields are set at steady values  $I_{S1}, I_{S2}, I_{S3}, I_{Sn}; I_{ELF1}, I_{ELF2}, I_{ELF3}, I_{ELFn}, I_{S1}/I_{ELF1}, I_{S2}/I_{ELF2}, I_{S3}/I_{ELF3}, I_{Sn}/I_{ELFn}$ , respectively.

19. The use of SELF non thermal fields according to claims 15 or 16, wherein said S and ELF fields are set at an overall intensity between 1 and 30 mT with respectively a ratio S/ELF comprised between 0,1 and 10.

10 20. The use of SELF non thermal fields according to claims 15 or 16, wherein said S and ELF fields are set at an overall intensity between 1 and 10 mT with respectively a ratio S/ELF comprised between 0,5 and 2,5.